

third broader behind than in front, rather concave above, traversed

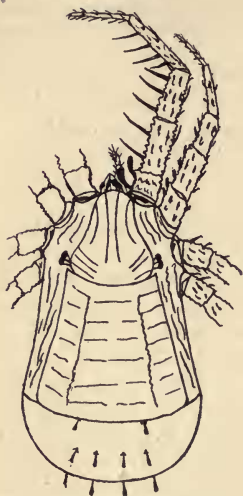


FIG. 16.—*Cæculus americanus*;
enlarged. (Original.)

by irregular low ridges, and two longitudinal lines rather nearer to the lateral margin than to the middle. Posterior abdominal shield much broader than anterior, its front border concave, broadly rounded behind, bearing above two scale-like hairs on the front border, four in a transverse line beyond the middle, and four more on hind border. Venter with large anal and genital openings close together. Legs very large and stout, first pair longest but plainly shorter than body, all roughened and clothed with clavate hairs, two on the front margin of the anterior trochanters are larger, spatulate and curved. The first leg is armed with stout erect, slightly curved spines, longer than the widths of the joints, two on the inner border of femur, three on the inner border of tibia, five on inner border of metatarsus; rather smaller and more curved ones on the lower outside margin of these joints. Palpi not very long, bristly.

Two specimens collected by Mr. H. G. Hubbard, at Palm Springs, California.

BIBLIOGRAPHY.

- Dufour, L. Descript. and figure of *Cæculus echinipes*. Ann. des Sci. Nat., XXV, 1832, p. 289, pl. 9, figs. 1-3.
 Gervais, P. Aptères, III, p. 260, pl. 38, fig. 5.
 Lucas, H. Explor. Algerie., p. 307, pl. 22, fig. 1.
 Canestrini & Fanzago. Sul. gen. *Cæculus*, p. 477; Acarof. ital., p. 75, pl. 2, fig. 1.
 Berlese, A. Acari ital.—Prostigmata, pl. 50, fasc. 50.

— Mr. O. F. Cook presented the following paper:

NEW DICELLURA.

By O. F. COOK.

The genus *Japyx* Halliday has been recognized* as a distinct order under the above name. To the Japygidæ is to be added a new family, Projapygidæ, founded on *Projapyx stylifer*, † a new

* Brandtia, p. 49, July, 1896. In October of the same year Mr. Ashmead published the name *Uratochelia* for the same group in Volume III of these Proceedings, page 327.

† See plate II, figs. 5a-5d.

species recently collected in the undisturbed humus of dense tropical forest at Mt. Coffee, Liberia. The habit is that of *Japyx*, the most conspicuous difference lying in the possession of a pair of jointed stylets instead of the caudal forceps. The abdominal legs are the same in number and location as those of *Japyx*, but differ in being of delicate structure and in bearing several hairs, one of which has a distinctly thicker base and is slightly curved; it is attached in a manner which warrants the suspicion that it may represent the claw. The antennæ have about twenty (18-23) joints, which are shorter and proportionately broader than those of *Japyx*. The legs, mouth-parts, and cephalic sclerites are those of *Japyx* throughout, but the head is not so square in front as in *Japyx*, being narrowed so as to be somewhat triangular in general shape. The last segment is short and broad, the long and strongly chitinized terminal sclerite of *Japyx* being evidently a specialization necessary to make the forceps effective.

In color the living insects were pure white or slightly creamy, sometimes slightly discolored by the dark contents of the alimentary canal. There was considerable difference in size and length of stylets, probably due to age. My largest specimen is about 3.5 millimetres long, not including antennæ or stylets, the latter being about .7 of a millimetre long, the former one millimetre. The habits and movements are so exactly those of *Japyx* that the first specimen was pursued as an early stage of that form. Several specimens were collected, though it was far less common than *Japyx* or *Campodea* in the same habitat.

The jointed stylets might be taken as indicating relationship with *Campodea* rather than with *Japyx*, but the approximation to the latter in the characters mentioned above is against such an inference, and the stylets, when examined more closely,* appear quite as different, to say the least, from those of *Campodea* as from those of *Japyx*. In the former type they are very long and slender, being composed of numerous joints several times longer than broad, each with several whorls of barbed hairs. The articulation of these rod-like stylets is rather imperfect. They are only slightly flexible and very fragile. The stylets of *Projapyx*, on the contrary, are composed of 10 distinct joints, of which all except the last bear two whorls of long, simple hairs. The last joint has as a distal projection a narrowly conic, truncated, transparent and rather faintly chitinized structure which may be a modified claw or sense-organ, nothing comparable appearing on the stylets of *Campodea*.

This new form may perhaps claim the distinction of being the most primitive insect yet known, since both *Japyx* and *Campodea* are somewhat more specialized. Whether it should be looked

* Plate II, compare figs. 5a and 5b with 6a.

upon as a connecting link between Japyx and Campodea cannot be decided until its internal anatomy has been studied, the internal differences between Japyx and Campodea being much greater than the external.

Supposing that the stylets of the forms under discussion are in reality legs, Japyx must have been preceded in evolution by some such type as the present. The analogy of the anal legs of Chilopoda gives support to this view, and the presence of a possible claw on the stylet of Projapyx enforces its claim to distinction as the most primitive insect. The functions of the stylets of these and many other hexapoda, such as the Thysanura and Embiidæ, are, no doubt, at least two. They support the abdomen, and are tactile organs, giving warning of danger from the rear. The multiplication of joints beyond that of normal legs is paralleled in the Chilopoda in the genus *Newportia*, which is indubitably a near relative of forms having anal legs with well developed claws and a normal number of joints.

NEW SPECIES OF JAPYX.

About twenty supposed species of Japyx have been named, of which very few are identifiable from the descriptions, these being rendered useless partly from a lack of sufficient attention to details, but chiefly because the number of specimens available for study has, in most cases, been so small that the formulation of any criteria of specific diagnosis and variability was not possible. Indeed, a far larger amount of material than is known to be available in the museums of the world would probably be necessary as a basis for a satisfactory classification of this neglected group. A preliminary examination of over a hundred specimens, nearly all of my own collecting, seems to indicate that there are geographical races or species distinguishable by the form and armature of the forceps, the demonstrated utility of other characters being very slight. The form and relative proportions of the forceps differ but slightly throughout the group. In all cases there is a distinct asymmetry, the two arms of the forceps never being exact counterparts, although the inequality is much more pronounced in some species than in others. Both arms are normally beset along their mesial edges by a row of denticules, with one conspicuous tooth located at or below the middle. Distad from these large teeth the denticules are nearly always arranged in a single row along the edge, while below the large tooth there seem to be normally two rows of usually rounded and flattened tubercles separated by distinct spaces. Accordingly, for convenience in description, the large process may be called simply the "tooth," those distad from it the "denticules," those proximad the "tubercles," while these last are "superior" or "inferior," according to position. The size, number, and arrangement of these basal

tubercles appear to furnish characters of systematic utility greater than the denticules beyond the tooth, which in nearly all cases decrease in size distad so gradually that their number is a matter of uncertainty, and appears subject to considerable variation.

The identification of immature specimens is likely to be always a matter of difficulty, especially if unaccompanied by adult material. Very young individuals have the forceps slender, equal, and almost or quite without armature, which, with the asymmetry and other peculiarities of the adult, is acquired gradually.

Left arm of forceps without tubercles; tooth located far below the middle; denticules few (4-5) and small, but arranged in two rows: *F. athenarum*, *sp. n.*, Athens, Berlin Museum. (Plate I, figs. 1a-1b.)

Left arm with few to many (3-20) tubercles usually arranged in two rows; tooth in nearly all cases located at or near the middle; denticules in a single row.....

Right arm with a single continuous row of about twenty small teeth, none of which is conspicuously larger or more prominent than the others: *F. hubbardi*, *sp. n.*, Chiricahua Mountains, Arizona, U. S. Nat. Museum. (Plate I, figs. 2a-2b.)

Both arms of forceps with one or two conspicuous teeth or nodiform prominences.....

Right arm with a large, smooth and even sinus below the tooth, then with an abruptly prominent nodiform process or second tooth which frequently shows signs of being composed of three coalesced tubercles; superior row of one or two small, though distinct, tubercles: *F. bidens*, *sp. n.*, Alabama, U. S. Nat. Museum. (Pl. I, figs. 3a-3b.)

Right arm with the sinus which separates the tooth from the first tubercle of the inferior row inconspicuous, or at least not as broad as the base of the tooth; without a conspicuous abrupt process formed of coalesced tubercles; superior row various.....

Right arm of forceps with four or five distinct, subequal tubercles in the inferior row; superior row wanting; left arm distinctly narrower and straighter, remaining nearly as narrow for some distance below the tooth as for some distance above it; the proximal sinus beset with about 20 distinct, spaced tubercles arranged in two subequal rows; tubercles not decreasing in size proximad: *Fafyx multicens*, *sp. n.*, Alabama, U. S. Nat. Museum. (Pl. I, figs. 4a-4b.)

Right arm with one or two tubercles, or the tubercles in two rows; superior row represented by at least one distinct tubercle; left arm not conspicuously straighter than the right, if narrower than the right it is distinctly broader immediately below the tooth than above it; tubercles less distinct, less numerous, and decreasing in size proximad.....

Right arm of forceps in adult specimens with the proximal edge of the

tooth nearly transverse, leading into a deep and distinct sinus followed proximad by two indistinct, broadly rounded, subcoalesced tubercles, with a single distinct tubercle in the upper row (Plate I, figs. 5a-5b); younger forms have the forceps more slender, the teeth smaller, the tubercles smaller, more distinct, and sometimes more numerous so that there may be three, or very rarely four, contiguous in each row (Plate I, figs. 6a-6b); *Fapyx liberiensis*, *sp. n.*, Western Liberia, type in U. S. Nat. Museum.

Right arm in adults with proximal edge of tooth distinctly sloping; no conspicuous sinus immediately below the tooth, usually with an evenly curved general sinus, similar to that of the left arm; tubercles mostly more numerous, spaced as on the left arm.....

Right arm of forceps with a single dentiform tubercle; left arm without denticles beyond the broadly triangular tooth: *F. creticus*, *sp. n.*, Crete, Berlin Museum. (Pl. II, figs. 1a-1b.)

Both arms with numerous and distinct tubercles and denticles; teeth distinctly convex on the distal edge.....

Right arm maintaining its width to the tooth, beyond which it is somewhat abruptly narrowed by an oblique edge armed with very distinct rounded denticles: *F. obliquus*, *sp. n.*, Liberia, U. S. Nat. Museum. (Pl. II, figs. 2a-2b.)

The two arms very similar in size and shape, distinctly narrowed from near the base; both sinuses evenly curved like the left arm of the last species

Forceps slender; teeth located somewhat below the middle; denticles small and indistinct: *F. javanicus*, *sp. n.*, Java, U. S. Nat. Museum. (Pl. II, figs. 3a-3b.)

Forceps robust; teeth located well above the middle; denticles fewer, large and distinct: *F. africanus* Karsch, Togo Colony, Berlin Museum. (Pl. II, figs. 4a-4b.)

EXPLANATION OF PLATE I.

The figures are camera tracings of the ventral aspect of the forceps. In some cases the outline of the superior row of tubercles has been placed upon the drawing opposite that of the lower row. The figures are not drawn to a uniform scale, which would have resulted in some being too small to make the armature visible, or others would have occupied an entire plate.

Figs. 1a-1b. Right and left arms respectively of the forceps of *Fapyx athenarum*.

2a-2b. Same of *F. hubbardi*.

3a-3b. *F. bidens*.

4a-4b. *F. multidentis*.

5a-5b. *F. liberiensis*.

6a-6b. *F. liberiensis*, a younger stage.

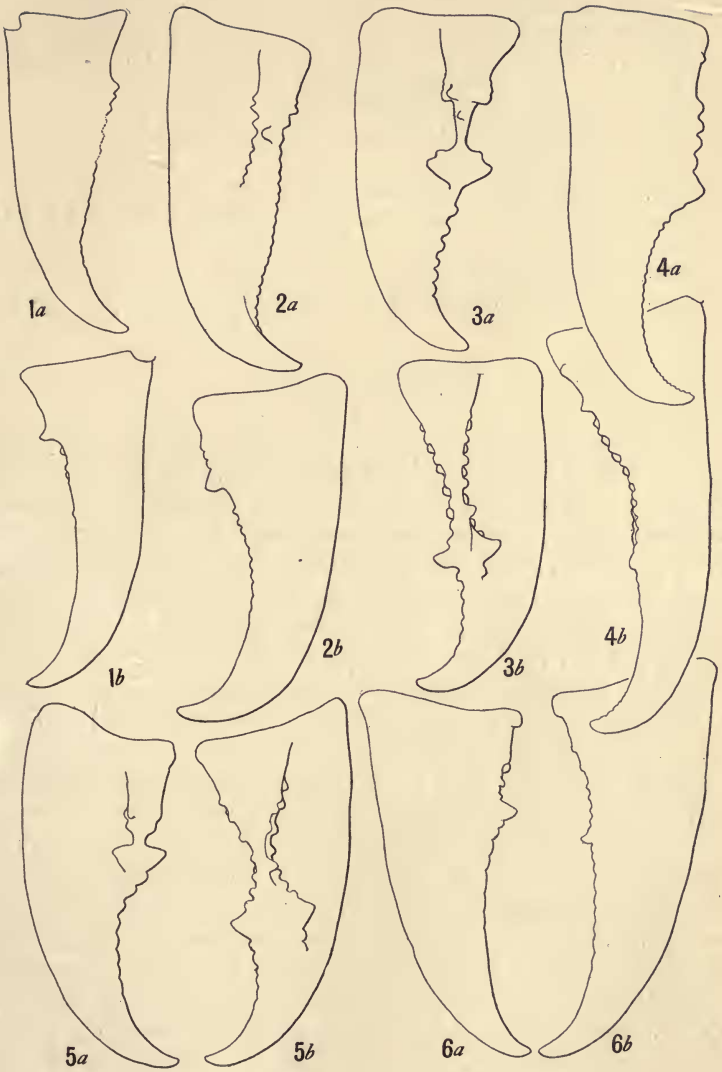


PLATE I.

EXPLANATION OF PLATE II.

- Figs. 1a-1b. *J. creticus*.
 2a-2b. *J. obliquus*.
 3a-3b. *J. javanicus*.
 4a 4b. *J. africanus*; the outline of the superior tubercles being somewhat more magnified.
 5a. Stylet *Projapyx stylifer*.
 5b. Six terminal joints of same, more magnified.
 5c. Abdominal leg.
 5d. Five distal joints of antenna.
 6a. Four distal joints of stylet of *Campodea sp.* from Grand Canary.
 6b. Five distal joints of antenna of same.
 7a. Two distal joints of antenna of *Japyx multidentis*.

Vice-President Gill occupied the chair, and the following members were also present: Messrs. Johnson, Benton, Schwarz, Heidemann, Busck, Dyar, Pratt, Motter, Hubbard, Ashmead, Howard, Cook, Currie, Swingle, Stiles, and de Schweinitz, active members, and Messrs. Greeley and Sherman, visitors. The following new members were elected: active—Dr. F. C. Kenyon; corresponding—Mrs. Annie Trumbull Slosson, New York, and Mr. R. J. Weith, Elkhart, Ind.

Officers for the year 1898 were elected, as follows:

President, Mr. Henry G. Hubbard; First Vice-President, Dr. T. N. Gill; Second Vice-President, Dr. H. G. Dyar; Corresponding Secretary, Mr. Frank Benton; Recording Secretary, Dr. L. O. Howard; Treasurer, Mr. E. A. Schwarz.

Additional members of Executive Committee: Mr. C. L. Marlatt, Mr. Wm. H. Ashmead, Mr. F. H. Chittenden.

— Under the head of "Short Notes and Exhibition of Specimens," Mr. Hubbard exhibited specimens of *Dinapate wrightii* in all stages. He had found the larva of this remarkably rare beetle boring in the trunk of *Washingtonia filifera* at Palm Springs, Cal., and the adults had been reared at the Department of Agriculture at Washington. He described the method of work and said that he considers this interesting species to be on the point of extinction. He called it the Dodo of beetles.

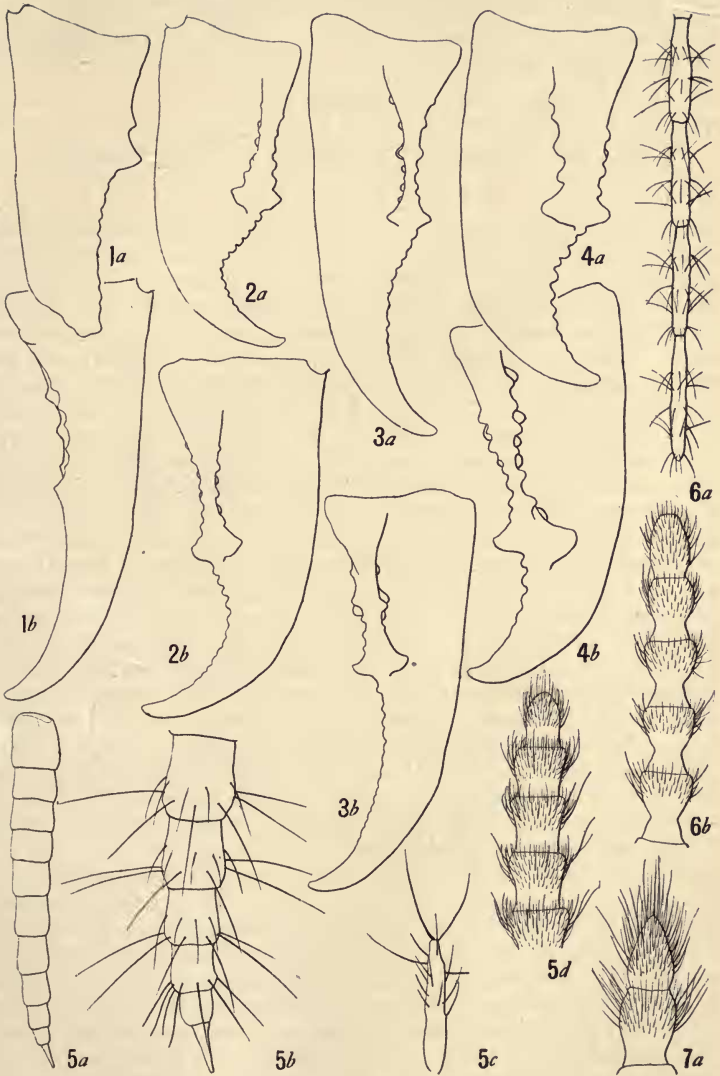


PLATE II.